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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/502,052

01/07/2005

Xavier Fanton

255861US0PCT

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02/03/2009

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EXAMINER

BRAYTON, JOHN JOSEPH

ART UNIT

PAPER NUMBER

1795

NOTIFICATION DATE

DELIVERY MODE

02/03/2009

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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<b>Office Action Summary</b>	<b>Application No.</b> 10/502,052	<b>Applicant(s)</b> FANTON ET AL.	
	<b>Examiner</b> John Brayton	<b>Art Unit</b> 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 30 October 2008.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1,2,5-18,20,21 and 23-26 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1,2,5-18,20,21 and 23-26 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED FINAL ACTION**

### ***Status of Claims and Objections***

1. Claims 1, 2, 5-18, 20, 21, 23-26 are pending.
2. Claims 3, 4, 19 and 22 have been cancelled.
3. Claims 23-26 have been added.

### ***Response to Amendment***

4. Applicant's amendment filed October 30, 2008 does not place the application in condition for allowance.
5. The rejection of claims 17-22 with US 6,277,523 under the doctrine of Double Patenting has been withdrawn.
6. Applicant's amendment to independent claim 1 requires new grounds of rejection under 35 U.S.C. 102(b) and 35 U.S.C. 103(a).
7. New claims 23-26 require new grounds of rejection under 35 U.S.C. 103(a).

### ***Claim Rejections - 35 USC § 102***

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 1, 2, 23 and 24 rejected under 35 U.S.C. 102(b) as being anticipated by Takao (US 4,107,019).

Regarding claim 1, Takeo teaches a target comprising  $\text{NiO}_x$ , wherein the nickel oxide is oxygen deficient with respect to the stoichiometric composition  $\text{NiO}$ , wherein x

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is less than 1 (col. 8, ln. 25-30) and having a target with an electrical resistivity of less than 10 ohm-cm.

Applicant discloses the target is formed using an intimate blend of nickel oxide and nickel powders in order to form the target, the intimate blend would have a desired electrical resistivity (Applicant's disclosure pg. 5, ln. 24-29, pg. 6, ln. 30-38). Takao discloses blending nickel oxide and nickel powder to form a target. This blending would result in a target with a stoichiometric composition deficient in oxygen. The target would therefore inherently have a property of electrical resistivity of 10 ohm-cm or less.

Regarding claim 2, Takao teaches a sputtering target wherein the stoichiometric deficiency stems from the composition of the intimate blend formed by nickel oxide powders and nickel powders (col. 8, ln. 25-30).

Regarding claims 23 and 24, as discussed above the resistance of the target would be an inherent property so long as the requirements as to the structure of the target are met. Since Takao teaches the features as required by Applicant, properties of the target would be inherent. Therefore the target having an electrical resistivity of less than 1 ohm-cm or less than 0.1 ohm-cm are inherent to the target of Takao.

### ***Claim Rejections - 35 USC § 103***

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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11. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

12. Claims 1, 15, 23 and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iida in view of Fujii et al (US 5,483,067).

Regarding claims 1, 23, and 24, the Examiner takes the position that the language "an essentially ceramic target for a sputtering device" is an intended use and as such is not given patentable weight.

Iida is directed to an optical recording medium of oxygen deficient nickel oxide using a target of nickel oxide to sputter a nickel oxide layer. Iida teaches a target comprised predominantly of nickel oxide, and a layer comprising predominantly nickel oxide, wherein the nickel oxide is oxygen-deficient with respect to the stoichiometric composition (col. 6, ln. 48-57). Since the deposited layer is oxygen deficient one skilled in the art would expect the target to have the same oxygen deficient property and electrical resistance as required by Applicant. Iida also teaches that X is strictly less than one (col. 6, ln. 48-57).

Iida teaches a target having the same stoichiometric composition required by Applicant, but does not explicitly teach a target having an electrical resistivity of less than 10 ohm.cm or less than 1 ohm.cm or less than 0.1 ohm.cm.

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Fujii teaches a nickel oxide layer with a resistivity of 0.45 ohm.cm (col. 23, ln. 23-24). The Examiner takes the position that Fujii does not explicitly teach a resistivity lower than 0.1 ohm.cm. It would have been obvious to one having ordinary skill in the art at the time the invention was made to lower target resistivity to less than 0.1 ohm.cm, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the target of Iida by forming a nickel oxide target with a resistivity of 0.45 ohm.cm, as taught by Fujii, because it would allow the target to conduct electricity with a reduced drive voltage.

Regarding claim 15, Iida teaches a thin layer based on nickel oxide by sputtering a ceramic target (col. 6, ln. 48-57), but does not explicitly teach magnetron sputtering. The Examiner takes the position that sputtering a target with magnetic enhancement is well known.

Fujii teaches a process for manufacturing a thin layer of nickel oxide using magnetically enhanced sputtering (col. 23, ln. 10).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Iida by providing a process for manufacturing a thin layer of nickel oxide using magnetically enhanced sputtering, as taught by Fujii, because it would concentrate the plasma over the target.

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13. Claim 2 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iida and Fujii as applied to claim 1 above, and further in view of Takao (as cited above).

Regarding claim 2, neither Iida nor Fujii explicitly teach the stoichiometric deficiency stems from the composition of the intimate blend formed by nickel oxide powders and nickel powders.

Takao teaches a sputtering target wherein the stoichiometric deficiency stems from the composition of the intimate blend formed by nickel oxide powders and nickel powders (col. 8, ln. 25-30).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the apparatus of Iida by providing a stoichiometric deficiency stems from the composition of the intimate blend formed by nickel oxide powders and nickel powders (col. 8, ln. 25-30) because it would allow the target to be formed by pressing (col. 8, ln. 25-30).

14. Claims 5, 6, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iida and Fujii as applied to claim 1 above, in view of Arai et al (US 5,981,092 as cited in IDS).

Regarding claims 5 and 6, neither Iida nor Fujii teach a minority element alloyed to nickel oxide.

Arai teaches a composite target (col. 3, ln. 66) comprised of predominantly of NiO (col. 4, ln. 38) with a minority element less than 50 atomic % (col. 4, ln. 43-67).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida, wherein nickel oxide is alloyed with a

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minority element less than 50 atomic %, as taught by Arai, because it would lower the resistivity and increase the quality of the film (col. 4, ln. 47-50).

Regarding claims 25 and 26, neither Iida nor Fujii explicitly teach the atomic percentage of the minority element is less than 30% or less than 20% calculated with respect to the nickel.

Arai teaches a sputtering target of NiO having a minority element of Boron with a volume percent of 8% compared to Nickel Oxide (col. 13, ln. 47-50). The Examiner takes the position that Arai teaches the atomic percentage of the minority element is less than 30% or less than 20% calculated with respect to the nickel.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida by providing the atomic percentage of the minority element is less than 30% or less than 20% calculated with respect to the nickel, because it would lower the resistivity (col. 4, ln. 45-50).

15. Claims 5, 6, 25, and 26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takao as applied to claim 1 above, in view of Arai et al (US 5,981,092 as cited in IDS).

Regarding claims 5 and 6, Takao does not explicitly teach a minority element alloyed to nickel oxide.

Arai teaches a composite target (col. 3, ln. 66) comprised of predominantly of NiO (col. 4, ln. 38) with a minority element less than 50 atomic % (col. 4, ln. 43-67).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao, wherein nickel oxide is alloyed with a



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minority element less than 50 atomic %, as taught by Arai, because it would lower the resistivity and increase the quality of the film (col. 4, ln. 47-50).

Regarding claims 25 and 26, Takao does not explicitly teach the atomic percentage of the minority element is less than 30% or less than 20% calculated with respect to the nickel.

Arai teaches a sputtering target of NiO having a minority element of Boron with a volume percent of 8% compared to Nickel Oxide (col. 13, ln. 47-50). The Examiner takes the position that Arai teaches the atomic percentage of the minority element is less than 30% or less than 20% calculated with respect to the nickel.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao by providing the atomic percentage of the minority element is less than 30% or less than 20% calculated with respect to the nickel, because it would lower the resistivity (col. 4, ln. 45-50).

16. Claims 7-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Iida, Fujii, and Arai as applied to claim 5 above in view of Campet et al. (US 5,522,976).

Regarding claims 7 and 8, Applicant is directed above for a complete discussion of Iida, Fujii and Arai. Neither reference teaches minority elements whose oxide is an electroactive material with anodic coloration. Nor does it teach minority elements of Co, Ir, Ru, or Rh. Iida as modified by Arai teaches a nickel oxide target alloyed with a minority element.

Campet is directed to a target for cathode sputtering. It teaches a target compound of NiO alloyed with a minority element from the metals of groups I-VIII of the

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Periodic table, these groups include minority elements consisting of Co, Ir, Ru, or Rh (col. 2, ln. 30-36).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida, Fujii and Arai by alloying with a minority element from the group of Co, Ir, Ru, or Rh, as taught by Campet, because it would allow these solid materials having the desired properties to be sputtered and form a high melting point target compound (col. 1, ln. 24-30).

Applicant discloses minority elements whose oxide is an electroactive material with anodic coloration, such as for example Co, Ir, Ru, and Rh or from those belonging to column one of the Periodic table (for example H, Li, K and Na). (Applicant's disclosure pg. 6, ln. 11-18). Since Iida and Arai as modified by Campet teaches a minority element from the group of Co, Ir, Ru, or Rh, the Examiner takes the position that an oxide of one of these minority elements is inherently an electroactive material of anodic coloration.

Regarding claims 9 and 10, Applicant is directed above for a complete discussion of Iida, Fujii and Arai. Neither reference teaches minority elements whose oxide is an electroactive material with cathodic coloration. Nor does it teach minority elements of Mo, W, Re, Sn, In, Bi, or mixtures thereof. Iida as modified by Arai teaches a nickel oxide target alloyed with a minority element.

Campet is directed to target for cathode sputtering. It teaches a target compound of NiO alloyed with a minority element from the metals of groups I-VIII of the

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Periodic table, these groups include minority elements consisting of Mo, W, Re, Sn, In, Bi (col. 2, ln. 30-36).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida, Fujii, and Arai by alloying with a minority element from the group of Mo, W, Re, Sn, In, Bi as taught by Campet, because it would allow these solid materials having the desired properties to be sputtered and form a high melting point target compound (col. 1, ln. 24-30).

Applicant discloses "minority elements whose oxide is an electroactive material with cathodic coloration, chosen from the group of Mo, W, Re, Sn, In, Bi" (Applicant's disclosure pg. 6, ln. 19-24). Since Iida as modified by Campet teaches a minority element from the group of Mo, W, Re, Sn, In, Bi, the Examiner takes the position that an oxide of one of these minority elements is inherently an electroactive material of cathodic coloration.

Regarding claims 11 and 12, neither Iida, Fujii nor Arai teach minority elements selected from the elements belonging to column one of the periodic table. Iida as modified by Arai teaches a nickel oxide target alloyed with a minority element.

Campet is directed to a target for cathode sputtering. It teaches a target compound of NiO alloyed with a minority element from the metals of group I of the Periodic table. Group I includes minority elements of H, Li, K and Na (col. 2, ln. 30-36).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida, Fujii, and Arai by alloying with a minority element from Group I of the Periodic table, as taught by Campet, because it would allow

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these solid materials having the desired properties to be sputtered and form a high melting point target compound (col. 1, ln. 24-30).

Regarding claims 13 and 14, neither Iida, Fujii nor Arai teach minority elements selected from the elements belonging to column one of the periodic table. Iida as modified by Arai teaches a nickel oxide target alloyed with a minority element.

Campet is directed to a target for cathode sputtering. It teaches a target compound of Ni alloyed with a minority element that is a metal or an alkaline earth or a semiconductor. Campet also teaches a minority element selected from the group consisting of Ta, Zn, Zr, Al, Si, Sb, U, Be, Mg, Ca, V, or Y (col. 2, ln. 30-36).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida, Fujii, and Arai by alloying with a minority element from the group consisting of Ta, Zn, Zr, Al, Si, Sb, U, Be, Mg, Ca, V, or Y (col. 2, ln. 30-36), as taught by Campet, because it would allow these solid materials having the desired properties to be sputtered and form a high melting point target compound (col. 1, ln. 24-30).

Applicant discloses a minority element selected from the group consisting of Ta, Zn, Zr, Al, Si, Sb, U, Be, Mg, Ca, V, Y is a metal or an alkaline earth or a semiconductor, wherein the hydrated or hydroxylated oxide of which is protonically conductive (Applicant's disclosure pg. 6, ln. 25-30). Since Iida as modified by Campet teaches a minority element from the group of Ta, Zn, Zr, Al, Si, Sb, U, Be, Mg, Ca, V, or Y the Examiner takes the position that the hydrated or hydroxylated oxide of one of these minority elements would be protonically conductive.

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17. Claims 7-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takao and Arai as applied to claim 5 above in view of Campet et al. (US 5,522,976).

Regarding claim 7 and 8, neither Takao nor Arai explicitly teach a minority element whose oxide is an electroactive material with anodic coloration. Nor does it teach minority elements of Co, Ir, Ru, or Rh. Takao as modified by Arai teaches a nickel oxide target alloyed with a minority element.

Campet is directed to a target for cathode sputtering. It teaches a target compound of NiO alloyed with a minority element from the metals of groups I-VIII of the Periodic table, these groups include minority elements consisting of Co, Ir, Ru, or Rh (col. 2, ln. 30-36).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao and Arai by alloying with a minority element from the group of Co, Ir, Ru, or Rh, as taught by Campet, because it would allow these solid materials having the desired properties to be sputtered and form a high melting point target compound (col. 1, ln. 24-30).

Applicant discloses minority elements whose oxide is an electroactive material with anodic coloration, such as for example Co, Ir, Ru, and Rh or from those belonging to column one of the Periodic table (for example H, Li, K and Na). (Applicant's disclosure pg. 6, ln. 11-18). Since Campet teaches a minority element from the group of Co, Ir, Ru, or Rh, the Examiner takes the position that an oxide of one of these minority elements is inherently an electroactive material of anodic coloration.

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Regarding claims 9 and 10, neither Takao nor Arai teach minority elements whose oxide is an electroactive material with cathodic coloration. Nor do they teach minority elements of Mo, W, Re, Sn, In, Bi, or mixtures thereof.

Campet is directed to target for cathode sputtering. It teaches a target compound of NiO alloyed with a minority element from the metals of groups I-VIII of the Periodic table, these groups include minority elements consisting of Mo, W, Re, Sn, In, Bi (col. 2, ln. 30-36).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida, Takao, and Arai by alloying with a minority element from the group of Mo, W, Re, Sn, In, Bi as taught by Campet, because it would allow these solid materials having the desired properties to be sputtered and form a high melting point target compound (col. 1, ln. 24-30).

Applicant discloses "minority elements whose oxide is an electroactive material with cathodic coloration, chosen from the group of Mo, W, Re, Sn, In, Bi" (Applicant's disclosure pg. 6, ln. 19-24). Campet teaches a minority element from the group of Mo, W, Re, Sn, In, Bi, the Examiner takes the position that an oxide of one of these minority elements is inherently an electroactive material of cathodic coloration.

Regarding claims 11 and 12, neither Takao nor Arai teach minority elements selected from the elements belonging to column one of the periodic table.

Campet is directed to a target for cathode sputtering. It teaches a target compound of NiO alloyed with a minority element from the metals of group I of the Periodic table. Group I includes minority elements of H, Li, K and Na (col. 2, ln. 30-36).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao and Arai by alloying with a minority element from Group I of the Periodic table, as taught by Campet, because it would allow these solid materials having the desired properties to be sputtered and form a high melting point target compound (col. 1, ln. 24-30).

Regarding claims 13 and 14, neither Takao nor Arai teach minority elements selected from the elements belonging to column one of the periodic table.

Campet is directed to a target for cathode sputtering. It teaches a target compound of Ni alloyed with a minority element that is a metal or an alkaline earth or a semiconductor. Campet also teaches a minority element selected from the group consisting of Ta, Zn, Zr, Al, Si, Sb, U, Be, Mg, Ca, V, or Y (col. 2, ln. 30-36).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao and Arai by alloying with a minority element from the group consisting of Ta, Zn, Zr, Al, Si, Sb, U, Be, Mg, Ca, V, or Y (col. 2, ln. 30-36), as taught by Campet, because it would allow these solid materials having the desired properties to be sputtered and form a high melting point target compound (col. 1, ln. 24-30).

Applicant discloses a minority element selected from the group consisting of Ta, Zn, Zr, Al, Si, Sb, U, Be, Mg, Ca, V, Y is a metal or an alkaline earth or a semiconductor, wherein the hydrated or hydroxylated oxide of which is protonically conductive (Applicant's disclosure pg. 6, ln. 25-30). Since Campet teaches a minority element from the group of Ta, Zn, Zr, Al, Si, Sb, U, Be, Mg, Ca, V, or Y the Examiner

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takes the position that the hydrated or hydroxylated oxide of one of these minority elements would be protonically conductive.

18. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over lida, and Fujii as applied to claims 1 and 15 above in view of Hashimoto et al (US 5,831,760).

Regarding claim 16, Applicant is directed above for a complete discussion of lida, Fujii. lida teaches a nickel oxide layer formed by sputtering a nickel oxide target. Nickel oxide is an electrochromic material that exhibits anodic coloration.

Hashimoto teaches an oxidative colored electrochromic layer comprised of nickel oxide (col. 4, ln. 37-49).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of lida and Fujii by producing an electrochromic material having an anodic coloration as a thin layer based on nickel oxide, because it would provide a layer with good optical properties and repeated durability (col. 4, ln. 42-45 of Hashimoto).

Regarding claim 17, Applicant is directed above for a complete discussion of lida and Fujii. lida teaches a nickel oxide layer formed by sputtering a nickel oxide target. Neither lida nor Fujii teaches an electrochemical device comprising a substrate provided with a stack of functional layers.

Hashimoto teaches an electrochemical device comprising a substrate provided with a stack of functional layers (Figures 1-6, Abstract of Hashimoto), including a layer based on nickel oxide (col. 4, ln. 37-49).



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The Examiner takes the position that the recitation “capable of” performs a function and is not a positive limitation but only requires the ability to so perform. Therefore the language “capable of reversibly and simultaneously inserting ions of the H<sup>+</sup>, Li<sup>+</sup>, or OH<sup>-</sup> type and electrons” is not given patentable weight.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida and Arai to provide an electrochemical device comprising a substrate provided with a stack of functional layers including a layer based on nickel oxide, as taught by Hashimoto, because it would provide a layer with good optical properties and repeated durability (col. 4, ln. 42-45 of Hashimoto).

Regarding claim 18, Applicant is directed above for a complete discussion of Iida and Fujii. Iida teaches a nickel oxide layer formed by sputtering a nickel oxide target. Neither Iida nor Fujii teaches an electrochemical device comprising a substrate provided with a stack of functional layers.

Hashimoto teaches an electrochemical device comprising a substrate provided with a stack of functional layers (Figures 1-6, Abstract of Hashimoto), including a layer based on nickel oxide, said layer being alloyed with a minority element consisting of a material whose oxide is an electroactive material with anodic coloration (col. 4, ln. 37-49).

The Examiner takes the position that the recitation “capable of” performs a function and is not a positive limitation but only requires the ability to so perform. Therefore the language “capable of reversibly and simultaneously inserting ions of the H<sup>+</sup>, Li<sup>+</sup>, or OH<sup>-</sup> type and electrons” is not given patentable weight.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida and Fujii, by providing an electrochemical device comprising a substrate provided with a stack of functional layers, including a layer based on nickel oxide, said layer being alloyed with a minority element consisting of a material whose oxide is an electroactive material with anodic coloration, as taught by Hashimoto, because it would provide a layer with good optical properties and repeated durability (col. 4, ln. 42-45 of Hashimoto).

The properties of the layer being an electrochemically active layer with a minority element consisting of a material whose oxide is an electroactive material with anodic coloration are inherent to a nickel oxide layer with a minority element consisting of Co, Ir Ru or Rh, as disclosed by Applicant on page 6, ln. 11-18.

19. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takao as applied to claim 1 above, and further in view of Fujii (US 5,483,067).

Regarding claim 15, Takao teaches using a ceramic target claimed in claim 1 to deposit a material layer on a substrate (col. 8, ln. 25-30). It does not explicitly teach a process for manufacturing a thin layer of nickel oxide using magnetically enhanced sputtering.

Fujii teaches a process for manufacturing a thin layer of nickel oxide using magnetically enhanced sputtering (col. 23, ln. 10).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Takao by providing a process for manufacturing

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a thin layer of nickel oxide using magnetically enhanced sputtering, as taught by Fujii, because it would concentrate the plasma over the target.

20. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Takao and Fujii as applied to claims 1 and 15 above, and further in view of Hashimoto et al (US 5,831,760).

Regarding claim 16, Takao teaches a nickel oxide layer formed by sputtering a nickel oxide target. Nickel oxide is an electrochromic material that exhibits anodic coloration. Neither Takeo nor Fujii explicitly teach an oxidative colored electrochromic material comprised of nickel oxide.

Hashimoto teaches an oxidative colored electrochromic layer comprised of nickel oxide (col. 4, ln. 37-49).

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the method of Takao and Fujii by producing an electrochromic material having an anodic coloration as a thin layer based on nickel oxide, because it would provide a layer with good optical properties and repeated durability (col. 4, ln. 42-45 of Hashimoto).

Regarding claim 17, Takao teaches a nickel oxide layer formed by sputtering a nickel oxide target. Neither Takao nor Fujii explicitly teach an electrochemical device comprising a substrate provided with a stack of functional layers.

Hashimoto teaches an electrochemical device comprising a substrate provided with a stack of functional layers (Figures 1-6, Abstract of Hashimoto), including a layer based on nickel oxide (col. ln. 37-49).

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The Examiner takes the position that the recitation “capable of” performs a function and is not a positive limitation but only requires the ability to so perform. Therefore the language “capable of reversibly and simultaneously inserting ions of the  $H^+$ ,  $Li^+$ , or  $OH^-$  type and electrons” is not given patentable weight.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao and Fujii to provide an electrochemical device comprising a substrate provided with a stack of functional layers including a layer based on nickel oxide, as taught by Hashimoto, because it would provide a layer with good optical properties and repeated durability (col. 4, ln. 42-45 of Hashimoto).

Regarding claim 18, Takao teaches a nickel oxide layer formed by sputtering a nickel oxide target. Takao does not explicitly teach an electrochemical device comprising a substrate provided with a stack of functional layers.

Hashimoto teaches an electrochemical device comprising a substrate provided with a stack of functional layers (Figures 1-6, Abstract of Hashimoto), including a layer based on nickel oxide, said layer being alloyed with a minority element consisting of a material whose oxide is an electroactive material with anodic coloration (col. ln. 37-49).

The Examiner takes the position that the recitation “capable of” performs a function and is not a positive limitation but only requires the ability to so perform. Therefore the language “capable of reversibly and simultaneously inserting ions of the  $H^+$ ,  $Li^+$ , or  $OH^-$  type and electrons” is not given patentable weight.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao, by providing an electrochemical device

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comprising a substrate provided with a stack of functional layers, including a layer based on nickel oxide, said layer being alloyed with a minority element consisting of a material whose oxide is an electroactive material with anodic coloration, as taught by Hashimoto, because it would provide a layer with good optical properties and repeated durability (col. 4, ln. 42-45 of Hashimoto)

The properties of the layer being an electrochemically active layer with a minority element consisting of a material whose oxide is an electroactive material with anodic coloration are inherent to a nickel oxide layer with a minority element consisting of Co, Ir Ru or Rh, as disclosed by Applicant on page 6, ln. 11-18.

21. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iida and Fujii as applied to claim 1 above, and further in view of IBM Technical Disclosure: Thermally Stable Thin Film Capacitor, February 1967.

Regarding claim 20, Applicant is directed above for a complete discussion of Iida and Arai. Iida teaches a nickel oxide layer formed by sputtering a nickel oxide target. Neither Iida nor Fujii teaches an electrochemical device comprising a substrate provided with a stack of functional layers.

The IBM Tech. Disclosure teaches an electrochemical device comprising at least one carrier substrate provided with a stack of functional layers, including at least one electrochemically active layer, capable of reversibly and simultaneously inserting ions, of the H<sup>sup.+</sup>, Li<sup>sup.+</sup> or OH<sup>sup.-</sup> type, and electrons, wherein said electrochemically active layer is based on nickel oxide, said layer being alloyed with a minority element

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selected from the elements belonging to the column one of the Periodic Table, said layer being obtained from a sputtering target.

The Examiner takes the position that the recitation “capable of” performs a function and is not a positive limitation but only requires the ability to so perform. Therefore the language “capable of reversibly and simultaneously inserting ions of the H<sup>+</sup>, Li<sup>+</sup>, or OH<sup>-</sup> type and electrons” is not given patentable weight.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida and Fujii by providing an electrochemical device with a stack of functional layers including at least one electrochemically active layer based on nickel oxide alloyed with a minority element selected from column one of the Periodic Table, because it would produce a device with a high capacitance per unit area and maintain stability during and after exposure to high temperature environments (IBM Tech. Disclosure pg. 1).

22. Claim 20 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takao as applied to claim 1 above, in view of IBM Technical Disclosure: Thermally Stable Thin Film Capacitor, February 1967.

Regarding claim 20, Takao teaches a nickel oxide layer formed by sputtering a nickel oxide target. Takao does not explicitly teach an electrochemical device comprising a substrate provided with a stack of functional layers.

The IBM Tech. Disclosure teaches an electrochemical device comprising at least one carrier substrate provided with a stack of functional layers, including at least one electrochemically active layer, capable of reversibly and simultaneously inserting ions,

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of the H.sup.+ , Li.sup.+ or OH.sup.- type, and electrons, wherein said electrochemically active layer is based on nickel oxide, said layer being alloyed with a minority element selected from the elements belonging to the column one of the Periodic Table, said layer being obtained from a sputtering target.

The Examiner takes the position that the recitation “capable of” performs a function and is not a positive limitation but only requires the ability to so perform. Therefore the language “capable of reversibly and simultaneously inserting ions of the H<sup>+</sup>, Li<sup>+</sup>, or OH<sup>-</sup> type and electrons” is not given patentable weight.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao by providing an electrochemical device with a stack of functional layers including at least one electrochemically active layer based on nickel oxide alloyed with a minority element selected from column one of the Periodic Table, because it would produce a device with a high capacitance per unit area and maintain stability during and after exposure to high temperature environments (IBM Tech. Disclosure pg. 1).

23. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Iida and Fujii as applied to claim 1 above, in view of Van Der Sluis (US 5,905,590).

Regarding claim 21, Applicant is directed above for a complete discussion of Iida and Fujii. Iida teaches a nickel oxide layer formed by sputtering a nickel oxide target. Neither Iida nor Fujii teaches an electrochemical device comprising a substrate provided with a stack of functional layers.

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Van Der Sluis teaches an electrochemical device comprising at least one carrier substrate (figure 1, 3) provided with a stack of functional layers (Figure 1; reference numbers 5, 7, 9, 11, 13) including at least one electrochemically active layer (col. 4, ln 4-30), capable of reversibly and simultaneously inserting ions, of the H.sup.+, Li.sup.+ or OH.sup.- type, and electrons, wherein said electrochemically active layer is a metal or an alkaline earth or a semiconductor, the hydrated or hydroxylated oxide of which is protonically conducted by sputtering (col. 4, ln. 25-26).

Since Van Der Sluis teaches a layer of a metal or an alkaline earth or a semiconductor, the properties of this layer wherein the hydrated or hydroxlyated oxide of the layer would be capable of protonically conducting are inherent. Therefore the hydrated or hydroxlyated oxide of the layer taught by Van Der Sluis would be capable of protonically conducting.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Iida and Fujii with an electrochemical device comprising at least one carrier substrate provided with a stack of functional layers, including at least one electrochemically active layer, capable of reversibly and simultaneously inserting ions, of the H.sup.+, Li.sup.+ or OH.sup.- type, and electrons, wherein said electrochemically active layer is a metal or an alkaline earth or a semiconductor, the hydrated or hydroxylated oxide of which is protonically conducted, as taught by Van Der Sluis, because it would allow use of solid state electrolytes therefore eliminating sealing problems and making the device easier to handle (col. 4, ln. 4-6).



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24. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Takao as applied to claim 1 above in view of Van Der Sluis (US 5,905,590).

Regarding claim 21, Takao teaches a nickel oxide layer formed by sputtering a nickel oxide target. Takao does not explicitly teach an electrochemical device comprising a substrate provided with a stack of functional layers.

Van Der Sluis teaches an electrochemical device comprising at least one carrier substrate (figure 1, 3) provided with a stack of functional layers (Figure 1; reference numbers 5, 7, 9, 11, 13) including at least one electrochemically active layer (col. 4, ln 4-30), capable of reversibly and simultaneously inserting ions, of the H.sup.+, Li.sup.+ or OH.sup.- type, and electrons, wherein said electrochemically active layer is a metal or an alkaline earth or a semiconductor, the hydrated or hydroxylated oxide of which is protonically conducted by sputtering (col. 4, ln. 25-26).

Since Van Der Sluis teaches a layer of a metal or an alkaline earth or a semiconductor, the properties of this layer wherein the hydrated or hydroxylated oxide of the layer would be capable of protonically conducting are inherent. Therefore the hydrated or hydroxylated oxide of the layer taught by Van Der Sluis would be capable of protonically conducting.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the device of Takao with an electrochemical device comprising at least one carrier substrate provided with a stack of functional layers, including at least one electrochemically active layer, capable of reversibly and simultaneously inserting ions, of the H.sup.+, Li.sup.+ or OH.sup.- type, and electrons,

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wherein said electrochemically active layer is a metal or an alkaline earth or a semiconductor, the hydrated or hydroxylated oxide of which is protonically conducted, as taught by Van Der Sluis, because it would allow use of solid state electrolytes therefore eliminating sealing problems and making the device easier to handle (col. 4, ln. 4-6).

### ***Response to Arguments***

25. Applicant's arguments with respect to claim 1 have been considered but are moot in view of the new ground(s) of rejection.

Applicant argues that the resistivity of the target of Iida is too high to be combinable with Fujii and as such Iida would teach away from Fujii.

Iida teaches a nickel oxide target with a stoichiometric composition as required by Applicant. Therefore properties of the nickel oxide, such as resistivity, would be inherent to the teaching of Iida.

The Examiner above has also cited Takao. Takao teaches a nickel oxide target formed by compacting nickel powder and nickel oxide powder (col. 8, ln. 25-30). The target of Takao is formed in the same manner as Applicant's and would inherently have a resistance. Since the Takao target and Applicant target are formed in the same manner the order of the resistance required for use as a sputtering target would at least be of the same order. Therefore the Examiner takes the position that Takao teaches or suggests a nickel oxide target having a suitable resistivity for sputtering.

***Conclusion***

26. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John Brayton whose telephone number is (571)270-3084. The examiner can normally be reached on 7:30 a.m. - 5:00 p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Nam X Nguyen/  
Supervisory Patent Examiner, Art Unit 1753

/J. B./  
Examiner, Art Unit 1795